

- 1           1.       An isolated DNA comprising:
  - 2           (a)       a nucleic acid sequence that encodes a polypeptide with the ability to co-  
3 stimulate a T cell, wherein the nucleic acid sequence hybridizes under stringent conditions to  
4 the complement of a sequence that encodes a polypeptide with an amino acid sequence with  
5 SEQ ID NO:1 or SEQ ID NO:3; or  
6           (b)       the complement of the nucleic acid sequence.

- 1           2.       The DNA of claim 1, wherein the nucleic acid sequence encodes a  
2 polypeptide comprising an amino acid sequence with SEQ ID NO:1.

- 1           3.       The DNA of claim 1, wherein the nucleic acid sequence encodes a  
2 polypeptide comprising an amino acid sequence with SEQ ID NO:3.

- 1           4.       The DNA of claim 1, wherein the nucleic acid sequence has a sequence of  
2 SEQ ID NO:2.

- 1           5.       The DNA of claim 1, wherein the nucleic acid sequence has a sequence of  
2 SEQ ID NO:4.

- 1           6.       An isolated polypeptide encoded by the DNA of claim 1.

- 1           7.       The isolated polypeptide of claim 6, wherein the polypeptide comprises an  
2 amino acid sequence of amino acid residue 23 to amino acid residue 290 of SEQ ID NO:1, or  
3 said amino acid sequence but differing solely by conservative substitutions.

- 1           8.       The isolated polypeptide of claim 6, wherein the polypeptide comprises an  
2 amino acid sequence of amino acid residue 23 to amino acid residue 290 of SEQ ID NO:3, or  
3 said amino acid sequence but differing solely by conservative substitutions.

- 1           9.       The isolated polypeptide of claim 6, wherein the polypeptide comprises an  
2 amino acid sequence of SEQ ID NO:1, or said amino acid sequence but differing solely by  
3 conservative substitutions.

1           10.     The isolated polypeptide of claim 6, wherein the polypeptide comprises an  
2 amino acid sequence of SEQ ID NO:3, or said amino acid sequence but differing solely by  
3 conservative substitutions.

1           11.     A vector comprising the DNA of claim 1.

1           12.     The vector of claim 11, wherein the nucleic acid sequence is operably linked  
2 to a regulatory element which allows expression of said nucleic acid sequence in a cell.

1           13.     A cell comprising the vector of claim 11.

1           14.     A method of co-stimulating a T cell, the method comprising contacting the T  
2 cell with the polypeptide of claim 6.

1           15.     The method of claim 14, wherein the contacting comprises culturing the  
2 polypeptide with the T cell *in vitro*.

1           16.     The method of claim 14, wherein the T cell is in a mammal.

1           17.     The method of claim 16, wherein the contacting comprises administering the  
2 polypeptide to the mammal.

1           18.     The method of claim 16, wherein the contacting comprises administering a  
2 nucleic acid encoding the polypeptide to the mammal.

1           19.     The method of claim 16, comprising:

2           (a)     providing a recombinant cell which is the progeny of a cell obtained from the  
3 mammal and has been transfected or transformed *ex vivo* with a nucleic acid encoding the  
4 polypeptide so that the cell expresses the polypeptide; and

5           (b)     administering the cell to the mammal.

1           20.     The method of claim 19, wherein the cell is an antigen presenting cell (APC)  
2 and the cell expresses the polypeptide on its surface.

1           21.     The method of claim 20, wherein, prior to the administering, the APC is  
2 pulsed with an antigen or an antigenic peptide.

1           22.     The method of claim 16, wherein the mammal is suspected of having an  
2 immunodeficiency disease.

1           23.     The method of claim 16, wherein the mammal is suspected of having an  
2 inflammatory condition.

1           24.     The method of claim 16, wherein the mammal is suspected of having an  
2 autoimmune disease.

1           25.     A method of identifying a compound that inhibits an immune response, the  
2 method comprising:

- 3           (a)     providing a test compound;
- 4           (b)     culturing, together, the compound, the polypeptide of claim 6, a T cell, and a  
5 T cell activating stimulus; and
- 6           (c)     determining whether the test compound inhibits the response of the T cell to  
7 the stimulus, as an indication that the test compound inhibits an immune response.

1           26.     The method of claim 25, wherein the stimulus is an antibody that binds to a T  
2 cell receptor or a CD3 polypeptide.

1           27.     The method of claim 25, wherein the stimulus is an alloantigen or an antigenic  
2 peptide bound to a major histocompatibility complex (MHC) molecule on the surface of an  
3 antigen presenting cell (APC).

1           28.     The method of claim 27, wherein the APC is transfected or transformed with a  
2 nucleic acid encoding the polypeptide and the polypeptide is expressed on the surface of the  
3 APC.

1           29.     A method of identifying a compound that enhances an immune response, the  
2 method comprising:

- 3           (a)     providing a test compound;
- 4           (b)     culturing, together, the compound, the polypeptide of claim 6, a T cell, and a  
5 T cell activating stimulus; and
- 6           (c)     determining whether the test compound enhances the response of the T cell to  
7 the antigen, as an indication that the test compound enhances an immune response.

1           30.     The method of claim 29, wherein the stimulus is an antibody that binds to a T  
2 cell receptor or a CD3 polypeptide.

1           31.     The method of claim 29, wherein the stimulus is an alloantigen or an antigenic  
2 peptide bound to a MHC molecule on the surface of an APC.

1           32.     The method of claim 31, wherein the APC is transfected or transformed with a  
2 nucleic acid encoding the polypeptide and the polypeptide is expressed on the surface of the  
3 APC.

1           33.     An antibody that binds specifically to the polypeptide of claim 6.

1           34.     The antibody of claim 33, wherein the antibody is a monoclonal antibody.

1           35.     The antibody of claim 33, wherein the antibody binds to the polypeptide with  
2 SEQ ID NO:1.

1           36.     A cell comprising the vector of claim 12.

1           37.     A method of producing a polypeptide that co-stimulates a T cell, the method  
2 comprising culturing the cell of claim 36 and purifying the polypeptide from the culture.

1           38.     A fusion protein comprising a first domain joined to at least one additional  
2 domain, wherein the first domain comprises a polypeptide of claim 6.

1           39.     The fusion protein of claim 38, wherein the at least one additional domain  
2 comprises the constant region of an immunoglobulin heavy chain or a fragment thereof.

1           40.     A nucleic acid molecule encoding the fusion protein of claim 39.

1           41.     A vector comprising the nucleic acid molecule of claim 40.

1           42.     The vector of claim 41, wherein the nucleic acid molecule is operably linked  
2 to a regulatory element which allows expression of the nucleic acid molecule in a cell.

1           43.     A cell comprising the vector of claim 42.

1           44.     A method of producing a fusion protein, the method comprising culturing the  
2 cell of claim 43 and purifying the fusion protein from the culture.

1           45.     The method of claim 14, wherein, the T cell is a helper T cell.

1           46.     The method of claim 45, wherein the helper T cell is a helper T cell that  
2 provides helper activity for a B cell antibody-producing response.

1           47.     The method of claim 45, wherein the B cell antibody response is an IgG2a  
2 antibody response.

1           48.     The method of claim 14, wherein the co-stimulation causes an increase in the  
2 level of CD40 ligand on the T cell surface.

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